

**Observation & Conversation Notes**  
**Humboldt Area Private Well Sampling – March 21 & 22, 2012**

**Background**

As this writer understands, responsive to a request or concern from the Keweenaw Bay Indian Community, the U.S. Environmental Protection Agency (EPA) initiated an investigation into groundwater quality around the former Humboldt Metallic Ore Processing Plant (Facility) in Humboldt Township, Marquette County, Michigan. A number of up-gradient and down-gradient individual drinking water wells were chosen for sampling.

There is a local groundwater divide at the Facility, which runs roughly northwest to southeast slightly south of the closed water-filled iron ore mine pit. Water flowing to the north from the Facility generally enters the Middle Branch Escanaba River at a point northeast of the Facility. Water flowing south generally enters into the Black River south of the Facility. Water immediately west of the Facility flows towards the Facility. Except for a short distance right at the Facility, water east of the Facility generally flows to the east towards the Middle Branch Escanaba River.

Initial samples were collected October 31 and November 1, 2011 from 10 water supply wells in the area. Two samples were collected from wells located approximately one mile west of the Facility and were labeled as background samples. The other eight wells were closer to or directly down-gradient from the Facility.

Based on issues with analysis methods, results, and some substances not analyzed for, the EPA agreed with State of Michigan and Humboldt Township requests to re-sample in the area. Nine of the original 10 wells were re-sampled March 21 and 22, 2012. Two wells not previously sampled were added and sampled during the second event. A staff person (this writer) from the State of Michigan, Department of Environmental Quality (DEQ) accompanied the EPA contractors during the March 2012 sampling event. What follows are notes about discussions the DEQ staff had with individual well owners and about observations made during the two-day event. The sample locations are presented in order of collection time.

Sample collection by the EPA contractor followed standard practices, and was appropriate at all samples sites. Wells were run for at least 10 minutes with water going to waste at each site. Once the wells were purged, the flow was reduced to a trickle to simulate low-flow sampling conditions. A new section of poly tubing was attached to sample taps at each residence to prevent cross-contamination. Samples were properly labeled and iced.

**Well at**

This well, owned by [REDACTED] is located down-gradient from the Facility, but is on the opposite side of the Middle Branch Escanaba River from the Facility. The river is directly connected to groundwater, is a gaining stream, and acts as a localized water table divide. There is an USGS stream gauging and water quality station located just upstream of the County Road FX bridge over the river.

According to [REDACTED] this well is a 1-1/4 inch diameter driven point well. It is located in a well pit a few feet from the residence. The driven well point is 25 feet below the ground surface.

There are sediment filter, water softener, and reverse osmosis treatment devices installed on his water supply. The EPA contractor sampled the well directly from a tap in the well pit. Thus, the treatment devices were bypassed, and the water samples were representative of groundwater at the well location.

**Well at** [REDACTED]

This well is owned by [REDACTED]. The well log for this well is available from the State of Michigan groundwater database (Wellogic). The well log is included in the attached file. The well, constructed in 1989 by Kleiman Pump & Well Drilling of Iron Mountain, Michigan (Kleiman) is a drilled well, 43 feet deep and located just east of the residence. It is down-gradient from the Facility. This well was not sampled during the first round in late 2011. The well is equipped with a submersible pump and has a nominal 6-inch diameter casing, which is not grouted.

According to [REDACTED], there are no filters or treatment units installed in the water supply. She said the water quality is terrible, so she only uses it for sanitary purposes. She said it is high in iron and leaves a brown "scummy" stain on everything. She has a bottled water dispenser in her kitchen for drinking water, and she hauls water from the Humboldt Township hall for cooking needs. The EPA contractor collected samples for analysis from the kitchen sink.

**Two Wells at** [REDACTED]

There are three residential structures served by one well at this location, all apparently owned by [REDACTED]. [REDACTED] is occupied by [REDACTED]. One residence [REDACTED] is occupied by Tom Heikkila. The third residence [REDACTED] is a rental, currently vacant. The well serving all three residences is a shallow, 6-foot deep, dug well located in front of the [REDACTED] residence. Water is obtained via a suction lift pump located in the residence. The water supply does not have a filter or treatment unit installed. Samples for analysis were collected by the EPA contractor from an outside hose bibb located on the back of the [REDACTED] residence. According to the EPA contractor, this is the same location where samples were collected in 2011.

[REDACTED] was present and discussed at length his belief that putting fertilizer in the Humboldt Mine pit many years ago has caused groundwater quality problems at his property. He went on to show us the "scummy" water in his other dug well. This well is located on the north side of the [REDACTED] residence. It is also a 6-foot deep dug well equipped with a suction lift pump. The pump is located in the basement of the residence. The well is currently not being used. It did have a cartridge sediment filter attached that could not be bypassed. Therefore, samples collected from this well had gone through the filter. [REDACTED] said the filter had not been changed in years. The filter was plugged with iron-rich sediment. Consequently, it was likely water did not go through the filter, but bypassed it across the top. The EPA contractor collected the samples from the first available tap in the basement near the filter location.

Both shallow wells at these locations are water table wells and are located on the same side of the Middle Branch Escanaba River as the Humboldt Facility. Both wells are down-gradient of the Facility.

[REDACTED] said when you draw water from the well at [REDACTED] and let it sit for a few hours, a thick slimy gelatinous material forms in the bottom of the glass. He showed us the

water surface in the well. It had a shiny thick sheen on top. When the sheen was poked with a stick, it broke apart in chunks, and quickly formed back together. This behavior is quite common with iron bacteria scum layers. The gelatinous material described by [REDACTED] is consistent with what can typically be seen in water heavily impacted by iron bacteria or some pseudomonas strains.

Two different wells are identified for these locations in Wellogie, one at 25 feet, and one at 20 feet in depth. [REDACTED] said both wells were driven points and both have been pulled. They no longer exist.

**Well at [REDACTED]**

This well, owned by [REDACTED] is a 1-1/4 inch diameter driven point well. It is located in the center of the basement and is equipped with a shallow well jet pump. There were no filters or treatment devices installed on the water supply. The EPA contractor collected samples for analysis from an outside hose bibb located on the east side of the building.

The basement had a dirt floor. With the recent spring snowmelt, the basement was flooded. There was about one foot of water covering the entire center area, including where the well is located. Since it is a driven well, the casing is not grouted. With the standing water around the casing, there is a very good chance surface water in the basement is being sucked down the annular space when the well is pumped.

This well had elevated arsenic in the 2011 samples. While discussing the arsenic with [REDACTED] she remarked that she was previously aware that her water contained arsenic. Apparently, the water supply was sampled during a random investigation in the area about 15 to 20 years ago, and her well had arsenic identified in it then. The DEQ staff person collected split samples from this well for metals analysis, including arsenic, and for general inorganic chemistry analysis.

**Well at [REDACTED]**

This well, owned by [REDACTED] is a drilled well with a submersible pump. According to the well owner, the well is a 350-foot deep bedrock well with about 40 feet of steel well casing installed. The original well was a marginal water producer and was hydraulically fractured to increase yield. The 8-inch diameter well is located west of the house off the driveway. [REDACTED] said he experiences no water quality issues except when he pumps the well for an extended period. When over-pumped, the well produces water containing a fair amount of silt. Upon inspection, the well cap identifies the well was constructed by Kleiman.

There is water softener installed on his water supply. However, he told us the outside irrigation system completely bypasses the softener. The EPA contractor hooked up to the irrigation system to collect samples for analysis.

This well is southwest of the Facility, and is the down-gradient opposite from the wells located on County Road FX. Groundwater flow is probably towards the Black River.

**Well at [REDACTED]**

This well, owned by [REDACTED] is a drilled well with a submersible pump. The well log is in Wellogie, and is included in the attachment. The well is a 300 foot deep bedrock well with 25

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feet of 6-inch diameter steel well casing installed. The annular space around the well casing was grouted with neat cement. The well is located in the front yard, and it was noted that the conduit containing the electric wire to the submersible pump was cracked at the well head. This can allow small insects to enter into the well. This well was constructed by Kleiman in 2004. The well is located south of the Facility and area groundwater flow is likely towards the Black River.

The owner was not readily available so it is unknown if any filters or treatment devices were attached to the water supply. The EPA contractor collected samples for analysis from an outside hose bibb located in the front of the residence.

**Well at [REDACTED]**

This well, owned by [REDACTED] provides water to a rental unit. The rental unit is currently occupied by [REDACTED]. The well is a 65-foot deep drilled bedrock well with 36 feet of 6-inch diameter steel casing. The casing is grouted with a bentonite slurry. The well was constructed in 2001 by Larry's Well and Pump Service. The well has a submersible pump and the well log was in Wellogic and is included in the attachment.

According to the tenant, [REDACTED], there are no filters or treatment devices installed in the water supply. The EPA contractor collected samples for analysis from the kitchen sink.

**Well at [REDACTED]**

This well, owned by [REDACTED] provides water to his residence. The well log was in Wellogic and is in the attachment. According to the well log, the well is a 61-foot deep drilled bedrock well with 28 feet of 6-inch diameter steel well casing. The annular space around the casing was not grouted. The well was constructed in 1981 by Siirtola Well Drilling and the well has a submersible pump. The well is located in the back yard and it was noted that the well cap sanitary seal was inadequate. A picture is attached showing the large crack in the well cap, which can provide insects and small mammals a pathway into the well.

[REDACTED] was not home, so we could not verify if the water supply has filters or treatment devices attached. The EPA contractor collected samples for analysis from a hose bibb located by the front porch.

This well and the well at [REDACTED] are both located directly west of the Facility. Based on hydrogeologic studies recently performed, groundwater flow in this neighborhood is from west to east towards the closed water-filled iron ore mine pit. Water exits the pit via groundwater seeps flowing into the wetland at the north end and eventually reaches the Middle Branch Escanaba River.

**Well at [REDACTED]**

This well is owned by [REDACTED] and according to [REDACTED] it is a dug well located approximately 400 feet west of the residence. This location places the well in the middle of a nearby wetland area. [REDACTED] is convinced the dug well is connected somehow to an air shaft from one of the nearby old abandoned underground iron mines. He claims the water quality is excellent; in fact, he swears it is the best water in the entire area.

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When questioned [REDACTED] said the water line from the well to the house was probably constructed back in the 1940s and was a galvanized pipe. He said it connects to copper plumbing in the basement. When asked if there was a dielectric coupling between the two dissimilar metals, he did not know what we were describing. Upon further discussion, [REDACTED] said [REDACTED] there were no filters or treatment devices attached to the water supply. The EPA contractor collected water samples for analysis from an outside hose bibb located on the west side of the residence.

The [REDACTED] well is the closest to the former Humboldt Mine pit, and is apparently located within the wetlands immediately adjacent to the north end of the pit. If any water supply in the area were going to be impacted by activity at the Facility, this would likely be the first one to experience quality issues.

#### Well at [REDACTED]

This well, owned by [REDACTED] is a drilled well with a submersible pump. The well log is in Wellogix and is attached. According to the well log, the well is 63 feet deep, has no screen, is completed in a coarse sand and gravel formation, has a 6-inch diameter casing that is not grouted, and produces a good quantity of water. The owner was not home so we could not verify if there were filters or treatment devices installed on the water supply, nor could we discuss any water quality concerns. The well was constructed by David Lentz Drilling in 1974. At some later point, it was worked on by Hakkala well drilling.

We noted a broken conduit, which could allow insects to enter the well. A picture showing the broken conduit and proof that Hakkala Well Drilling worked on the well is attached. This well is located more than a mile west of the Facility, and is considered a background, up-gradient well.

The EPA contractor collected samples for analysis from a hose bibb located on the west side of the residence.

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